

The Spirituality of Contemporary Sustainability

An Honors Thesis (HONR 499)

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Abstract

Spirituality has been a foundation of civilizations for centuries. Despite an overall movement away from identifying with nature as a basis for spiritual identity, the contemporary sustainability movement seeks to reconnect man and nature in an effort to restore our provisional resources. Sustainable methods help to strengthen connections between the individual, community, and Earth in a manner that mirrors the practices of many ancient cultures exhibiting beliefs in the concept of universal connectivity. Analysis of Mesopotamian, Aztec, and Native American belief systems provides insight to man's place as servants and caretakers of the Earth. By examining American ideals of production and progress through its cultural development from colonization to modern times, the need for sustainable technologies is better understood. As methodologies of sustainable agriculture, water management, and energy production usher in yet another cultural shift that helps men realize their roles as stewards of the Earth's resources, these tools can be viewed as symbols of a contemporary belief in universal connectivity.

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Introduction

Originating with many of the earliest recorded peoples and cultures, the spiritual concept of universal connectivity relates man to the natural world by suggesting that all things on Earth are connected. It maintains that while the self, human collective, and natural world exist as three distinct realms, only a deep respect and understanding of all three individually and combined allows us to truly appreciate our place in the universe. Through the progression of history, this belief system has undergone multiple transformations as societies modernized and expanded, and was perhaps last clearly expressed during the Transcendentalist Movement of the mid-nineteenth century. Nearly a century later, the ideology that undergirds universal connectivity has begun to appear once more with the emergence of current sustainability trends.

Initially spurred by the environmental movements of the mid-1900s, the sustainability movement is daily becoming more widespread and important in the contemporary world. According to entrepreneur, author, and environmentalist Paul Hawken, “[t]he first rule of sustainability is to align with natural forces, or at least not try to defy them” (BrainyQuote 2001). Sustainability emerged as a response to concerns surrounding the increased consumption of our natural resources, which reflected rapid population and economic growth, and its appearance was braced against one main principle: that everything necessary for the human population’s survival relies on our natural world and its forces (EPA 2015). Since its inception, the ideal of sustainability has grown around the few core principles discussed above, but its definition has varied between agencies and topics. For example, the principles of sustainable development may differ from those of sustainable economic growth or energy usage.

As society continued progressing and expanding, the disconnect between the human experience and our understanding of the natural world's importance was widened. With the acceptance of sustainability, a growing respect for and need to reconnect with nature surfaced in areas such as energy production and agriculture. As it emerged, the sustainability paradigm involved the environmental, economic, and social sectors of life (Witta, Flanagan, & Hagan 2012), and has become a successful model for society to work towards. Although an understanding of sustainable business models and environmental policies have helped society to accept the movement on a broader scale, it can be argued that the principles defining sustainable agriculture and energy production have worked to impact the cultural sector of life as well. Sustainability with respect to energy, agriculture, and architecture can be defined as production that is based upon the principles of ecological health, economic viability, social empowerment, and cultural creativity (VBC 2013-b). By working to again associate the human body with the provisional power of nature, sustainable production methods can be viewed as tools by which we have begun reconnecting with the earth both physically and spiritually.

This study begins with a conceptual analysis of the ancient belief in universal connectivity as it appeared in cultures around the world. The presence of these ideals in everyday life on the American frontier is then examined as an example of the philosophical conversion society underwent with the birth of industrialism. Next, this study considers sustainability as a response to the negative consequences of American modernization and global responses to population growth. Although implementation of sustainable methods has occurred worldwide, the second and third sections focus on the United States since American principles can easily be traced to both European and indigenous roots. The

cultural blending of spiritual and socio-economic philosophies allowed an entirely new era of lifestyle behaviors to emerge in the United States. In addition to its multi-cultural beginnings, industrialization made the United States a major economic power, which influenced urbanization and economic growth across the globe. Despite continued progress, many European countries maintained traditional farming and resource management practices. In contrast, the United States quickly adjusted its agricultural and energy production methods to meet the needs of an expanding nation. Environmental and social health concerns would not be addressed in the United States until industrialism's negative consequences amassed and posed threats decades later. Because of globalization, American culture is continuously observed and mimicked around the world; and as the U.S. begins addressing concerns using sustainable methods, other countries are following suit. Finally, this project examines the model of sustainability as a means of reconnecting man with nature by exploring its methods and technologies as symbols of a contemporary belief in universal connectivity.

Universal Connectivity

By using both modern technologies and traditional techniques, we have attempted to return to, or at least to mimic, the cyclical patterns of the natural world. Through this natural homecoming that sustainability offers, we are able to appreciate and respect the natural world because of all that it provides us, while also understanding our place in its cycles on both the individual and collective levels. Implementing sustainable methods can allow individual practitioners and even communities to recognize the importance of the self, human collective, and natural world simultaneously for their combined significance on a larger scale. Together, these three areas provide us with a complete understanding of

universal connectivity and how aspects of our identity come together to simultaneously impact and respond to the world around us. Therefore, sustainable methods can be viewed as symbols of this understanding and mechanisms through which we express our contemporary belief in universal connectivity.

Sustainable technologies and methods such as solar panels, aquaculture and aquaponics, conservation tillage, rotational grazing, pervious concrete, and urban agriculture both physically and symbolically depict a modernized expression of universal connectivity and its basic principles. While the spiritual significance of such systems relating to universal connectivity may seemed to have developed in the contemporary era, universal connectivity is a belief system that has appeared in cultures throughout history. Not only have previous societies shared a belief that all life on Earth is connected, but they have also demonstrated how these connections play a vital part in the individual's life by helping him understand his purpose and place in the world.

Ancient Mesopotamians

Considered one of the first and most influential areas of civilization, Ancient Mesopotamia included several budding cultures that inhabited the Fertile Crescent region beginning around 9000 BCE (Ancient History Encyclopedia 2009). Ancient Sumeria was one of the many cultures present in this area and constructed an intricate religious system reflecting many aspects of universal connectivity. Ancient Sumerians believed that the world was organized and maintained by extremely powerful supernatural forces. If individuals or cities failed to appropriately please the gods, the result could be great misfortune for entire kingdoms (The British Museum 2015). It was the duty of both the individual and the community collectively to do what was necessary to please the gods.

Therefore, in addition to prayers, the Sumerians presented their gods with bountiful offerings of all sorts to please them and prevent hardship from falling upon their cities. Many of these offerings included food due to its importance in everyday life and the people's belief that the gods controlled the presence of available food.

For example, many Sumerian fishermen were in the service of temples in Mesopotamia since fish were viewed as an important food item for both men and the gods (Van Buren 1948). Many artifacts existing from that period even depict fish alongside or in place of deities. These representations suggest that fish, like many other foods, had a "mystical meaning, and...were a symbol of life..." (Van Buren 1948). The connections between food, people, and the gods were so important to the Ancient Mesopotamians that they followed the individual into the afterlife. The Warka Vase (Fig. 1) is a funerary bas-relief portraying the societal hierarchy in Ancient Sumer. Carved from lasting inorganic

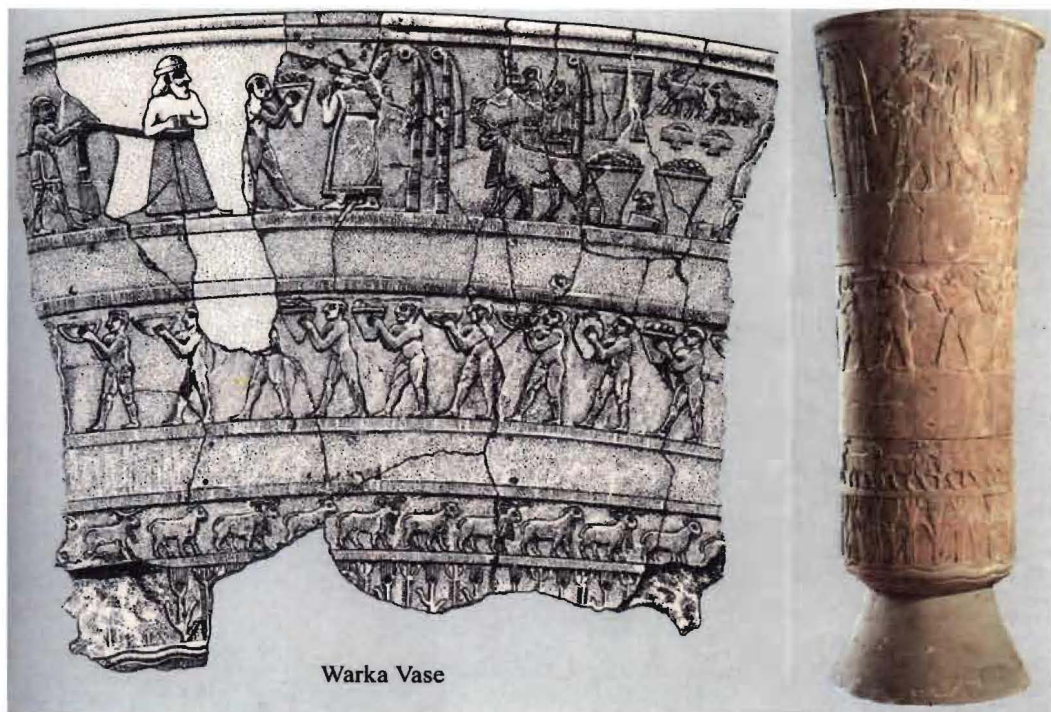


Figure 1. The Warka Vase depicts the social hierarchy of life in Ancient Sumer. Although each level shows images of crops, animals, humans, and gods all of different sizes, each were considered equally important in the cycle of life (Lima 2011).

stone rather than a more easily degradable organic material like wood, the vase likely had an elevated value above other carvings existing from the period (Albenda 1983). Its images depict the multiple tiers present in the city's communal framework that together form the cycle of life necessary for success. The tiers depict the community's belief in the interconnectedness of all things by showing in ascending order: grains at the bottom followed by herds of sheep, men and women working in fields, priests and priestesses offering food to the gods, and the Sumerian goddess Inanna at the very top.

The ancient people prized the grains and animals that the gods blessed them with as means of subsistence and showed the gods their thankfulness by making offerings of these things. They cherished the value of the natural world and understood its significance to their own lives. The small size of the images of humans on the funerary Warka Vase might suggest that the people of Ancient Mesopotamia saw themselves playing a much smaller role than the land itself in the natural order. However, its job as a funerary vase was to hold the remains, and essentially the soul, of the deceased person, representing a final act of reconnecting him with the natural cycle of the world depicted in the vase's images.

Aztec Indians

Artifacts existing from cultures in Pre-Colonial Latin America, such as those of the Aztec Indians, suggest that their culture also expressed similar beliefs regarding the place of the individual within the natural cycle. Although there is little evidence pointing to an emphasis placed on the importance of the individual self, surviving works from the Aztec Indians offer an insight into their belief in the power of the human collective and spiritual significance of the natural world. The Aztecs had a complex religious structure that placed their gods much higher than themselves. They also upheld the philosophy that humans

exerted only a certain degree of power over the world around them and were continuously subject to nature's wrath or mercy.

Many studies of Aztec society suggest that its people believed in the reciprocal connections between their worship of the gods and the success of their lives and communities (Bošković 1992). Boškovic (1992) asserts that "...in some sense, by worshipping the deities[,] society worships itself" and that the ultimate function of religion for the Aztec people was to establish collective solidarity and power. Physical and spiritual power were important because they enabled the Aztec people to conquer lands and foes as well as spiritually elevate themselves above those they captured and often sacrificed. While the Aztecs committed many savageries, their sacrificial ceremonies resulted in the development of a collective spiritual identity amongst the Aztec people, which was significant to their expression of universal connectivity.

Analysis of spiritual beliefs as depicted in *The World Tree* (Fig. 2) offers one of the



Figure 2. The World Tree is a motif that occurs in multiple pre-Columbian cultures. By depicting the tree from its roots to its very highest point, the World Tree represents an axis that connects all realms of life (Putney 2011).

clearest understandings of universal connectivity's significance in the Aztec culture.

Originally created around 300 AD, *The World Tree* is a reproduction of a mural in the Tepantitla Complex in Teotihuacan depicting one of the Aztec people's many deities who was later deemed a goddess. While it has been argued from an anthropological perspective that the figure depicts an Earth Goddess (Furst 1972), most scholars have now accepted archeology and art history expert Esther Pasztory's identification of the deity as the Great Goddess of Teotihuacan (Berlo 1992).

Here, the Great Goddess is shown before a tree that actually appears to be growing from her and showering the Earth with its bounties. The tree can be viewed as a symbol of abundance considering the profusion of flowers, butterflies, fish, and shells adorning it while the Goddess herself has water flowing from her hands. She provides the means for all life to the people below who give back to her in the form of praise and offerings. The direct connections between humans, nature, and the divine presented in *The World Tree* show a belief in the cycle of life as it includes man. In conjunction with the strong collective spirit created by the Aztecs practiced religion, these depictions also validate the evident presence of universal connectivity as a spiritual truth in this pre-colonial Latin American culture.

Apache Indians

Religious beliefs and practices that demonstrate similar beliefs are present in Native American cultures, namely the Apache Indian tribes, existing across the North American continent for hundreds of years before the European colonial invasion. Many of the Apache beliefs centered on the natural world, respecting its provisions, and giving back to the Earth so that it may continue to provide. Native American beliefs in a cyclical pattern of nourishing the Earth so that it in turn provides nourishment for the body mirrors the

spiritual symbolism the Apache people allotted to the circle itself. Like many Native American tribes, the Apache regarded the circle as a symbol of unity for all creation (Chiricahua 2000). They observed Seven Natural Laws, one of which regarded the circle and its definition with regards to the universe:

Our ancestors observed that everything about life is circular; the sun, moon, earth, growth rings of a tree...When we come together in a circle, it is a reminder that everyone's presence is of equal importance...the circle promotes and supports the flow of energy in a never-ending cycle consistent with the movement of creation itself (Chiricahua 2000).

Seeing the human soul as part of a circle that's connected to nature allowed the Apache to understand their place among the Earth's elements and respect the force of the natural order.

The *Traditional Apache Blessing* (Fig. 3) speaks beautifully of the life force flowing through the Earth (Chiricahua 2000). As a blessing used for wedding ceremonies and nightly prayers alike, it is intended to bring a sense of peace and comfort to the soul through understanding ones

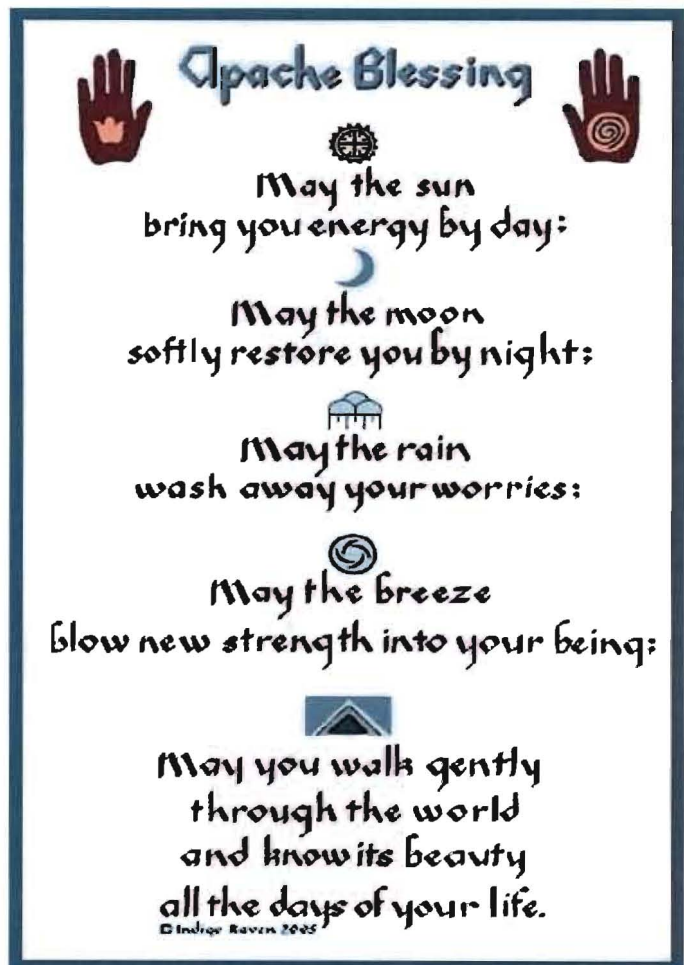


Figure 3. This Traditional Apache Blessing is one of many blessings often recited at weddings to wish the couple happiness and peace (Apache Blessing).

place among the elements. Although this poetic blessing refers to inanimate forces—sun, moon, rain, and breeze—it describes a connection between those forces and the soul. This blessing asks that man be granted the wisdom to respect these provisions of life offered by the Earth so that he may survive. The prayer asks that the sun might “bring...energy by day” (Apache Blessing), creating a bond between the sun’s energy and man’s physical strength to perform daily duties as well as emotional strength to take on another day. The final line of the blessing asks that man “walk gently through the world and know its beauty” (Apache Blessing). This advocates for a more direct connection between man and nature by suggesting that respect for the Earth is necessary for man’s success. To see the true beauty of something is to understand its real value. Therefore, knowing the beauty of the Earth is to know its worth and importance to the continuance of human life.

Water, one of the Earth’s many essential provisions, is also mentioned in this blessing and creates yet another connection between the Earth and man. As demonstrated in this prayer, water is thus considered both a physical and spiritual necessity. The prayer asks that rain will wash away one’s worries as a source of cleansing. This request is appropriate since water is a basic necessity for life to exist. Often, where there is water, there is also a source of food, which in turn provides sustenance. The emphasis that the Apache placed on the individual’s place in the much larger world as well as their understanding of the reciprocity required for survival can be viewed as some of the clearest beliefs in universal connectivity among early American cultures.

The New World: A New Ideology

The presence of beliefs and ideologies rooted in universal connectivity were seemingly commonplace and widespread in cultures throughout history as early as the

very beginnings of civilization. As Europeans began migrating to the New World, however, a major shift occurred that would shake the principal spiritual ideology, lifestyle, and outlook on the natural world for centuries. Considered by scholars to mark the beginning of the early modern period (Gilder Lehrman 2015-a), the American colonial era acted as a bridge that allowed for the blending of indigenous knowledge and European lifestyle. Early 17th-century colonization of the New World brought along an infiltration of European technologies into nearly every aspect of life and the establishment of growing communities such as Acadia, Jamestown, and Santa Fe (Gilder Lehrman 2015-a, Lemon 1987).¹ Followed by the arrival of Pilgrims in Plymouth, Massachusetts, in 1620 (Gilder Lehrman 2015-a), a new way of life and thinking swept across the continent.

Life on the new colonial frontier required acclimation to a semi-indigenous lifestyle that would help settlers thrive in their new environment. After learning the necessary practices to survive, colonists quickly began building communities similar to their European counterparts. Economic prosperity eventually meant population growth and a restructuring of the city center to allow for the development of business and trade hubs (Lemon 1987, Smith 1987). Desire for material expansion overshadowed the values of responsible production and drove agricultural practices farther into the margins surrounding cities (Lemon 1987). The growing physical disconnect between people and the land that provided for them became evident as man's spiritual understanding of his place in the natural order weakened.

¹ Acadia was established in the area now known as Eastern Canada by the French in 1604 after Champlain claimed Huron country for France. Jamestown, Virginia was established by John Smith in 1607 and quickly established as the first permanent English colony. Santa Fe was settled in present-day New Mexico by the Spanish in 1609 (Gilder Lehrman 2015-a).

Early American Life

The North American continent provided settlers with unknown obstacles and opportunities alike. As new territories were explored and the edges of claimed land pushed farther west, the frontier lifestyle emerged. Defined by interactions between indigenous cultures and westward-moving settlers, the frontier became a borderland between European life in the colonies and the primitive native world. Frontiersmen learned to balance European religion, architecture, and politics with new agricultural, hunting, and economic practices acquired from Native Americans (Turner 1894). Naum (2010) suggests that as settlers faced an unknown wilderness in their movement westward and away from colonial society, the frontier was responsible for the creation of American culture as it began disassociating with European influence (Naum 2010, Turner 1894). American historian Frederick Jackson Turner (1894) describes the frontier as a space to be dominated and domesticated. Despite Turner's depiction of native frontier inhabitants as obstacles to overcome (Naum 2010), the New World blending of philosophical ideology is likely due to settler interactions with indigenous peoples in these areas.

Described as the margin of a settlement with a density of two or more individuals per square mile, the American frontier was commonly settled by individuals or single families rather than whole communities (Turner 1894, Lemon 1987). Households were often completely dependent on what they could provide for themselves. Given the indigenous people's knowledge of the land, many settlers likely observed and adopted native practices on the frontier for food production and attainment as well as shelter. The close proximity and documented interactions between tribes, such as the Iroquois, and European settlers, suggest that early American philosophy was influenced by both

European ideals and the Native American perspective of universal connectivity (Pratt 1996). Native beliefs in universal connectivity may have affected early American philosophy as it budded along the frontier, but the desire for progress proved a much stronger influence on urban American ideology. Fithian and Powell (2009) define early progress as linear and irreversible improvements towards the ideal way of life by expanding to meet the needs of a growing population and overcoming a reliance on nature. Unlike the ideology of universal connectivity, which stressed the importance of keeping a balance between man and nature, progress required men to assert complete dominance over the land and surpass the provisional limits of nature.

With roots deep in British mercantilism, trade and political interactions between the American colonies and Europe prior to the Revolutionary War provided a strong base for the buds of modern American capitalism, urbanization, and industrialization to begin developing (Gilder Lehrman 2015-a). Perhaps the most influential transaction at the time was the cultural exchange between European and American society, which led to the adoption of a new philosophy that aimed to uphold man as the master of his surroundings. Many intellectuals in colonial America saw themselves and their ideals as direct extensions of their European predecessors (Fiering 1977). Unlike indigenous Native Americans whose beliefs were predominantly rooted in a worldly and naturalistic base, emerging American intellectuals looked largely to European politics, economics, and industry for philosophical leadership (Fiering 1977).

From European colonization until the end of the 18th century, American progression of thought and ideology in all areas of life—including spirituality, agriculture, urbanization, industrialism, politics, etc.—kept pace with the rest of the Western world (Fiering 1977).

As a result of European philosophy outweighing the influence of Native American spirituality, the New World ushered in an important ideological change. Man's view of his place within the natural world and its importance in daily life transformed from one of cooperation and harmonious connection to one of misguided supremacy over nature's provisions (Fithian & Powell 2009). Instead of repairing, reusing, and allowing for a naturally rejuvenating cycle, progress now meant shorter product lifecycles and constant replacement of objects by newer and better ones (Fithian & Powell 2009).

Age of Change

Developing settlements along the coast were primarily influenced by traditional European ideology as it was transferred to the New World through immigrants and taught to subsequent generations. Similar to homesteads on the frontier, the earliest and smallest settlements in close contact with native populations likely observed native practices and assimilated indigenous views on use of the natural world to survive in their new environments. In contrast to those on the frontier, early coastal colonial communities began pushing their energy and food sources outside of the city center as population growth and continued immigration required expansion, industrialization, and commercialism.

By the mid-18th century, the four largest colonial seaports in Boston, Philadelphia, New York, and Charleston were thriving due to the influence of British mercantilism. Growth and wealth were shown in these cities through paved streets, detailed architectural structures, and an influx of craftsmen skilled in areas other than food production who were opening shops (Lemon 1987, Smith 1987). The northern cities were surrounded by less fertile land and began commercializing non-crop products and industrializing their

production methods, but Charleston's prosperity came from fertile lowland production of indigo, rice, cotton, and tobacco (Lemon 1987, Smith 1987). Charleston was reliant on a plantation economy for food and commodities while northern cities were pushing agricultural production farther from their epicenters to increase focus on industrial production. Smith (1987) suggests that Charleston's dependence on British trade coupled with a lack of industrial production methods was responsible for the city's economic downfall following the Revolutionary War. For the next century, an industrial mindset seemed to be the key to prosperity for growing cities throughout the North. The resulting pre-industrial centers, with agricultural production located on their outskirts, were becoming increasingly isolated from the natural world as a dependence on the manufactured world transformed daily life.

In the decades following the Revolutionary War, an upwelling of political thought and economic freedom led to an increasing disconnect between growing cities and the natural world providing for them (NPS 2008) as competition in the global market became a greater goal for the new America (Fiering 1977, Lemon 1987). Prior to that time, the British Government had tried to limit settlement west of the Appalachian Mountains by American colonists (Department of State 2015), which allowed for the territories of many Native American tribes in the area to remain intact.² Once British control ceased, westward settlement was no longer restricted, and Americans came to consider pioneering across the frontier their new birthright (Friend 2005). Native tribes had lost the last indirect source of

² After the Treaty of Paris of 1763 ended the Seven Year's War, British officials alienated and antagonized Native American tribes who had allied with the French. When the British learned of plans for attack by native forces, the Royal Proclamation of 1763 was issued, limiting colonial settlement west of the Appalachian Mountains to create an Indian reserve (Department of State).

of protection for their lands and faced increasing pressure from waves of settlers moving westward (NPS 2008). As the Native Americans moved away from their homelands, their philosophies of the natural world left with them, and American expansion led to the beginning of the Industrial Age.

Technological innovations of the mid-1800s slowly ushered industrialization into large cities across the country (Gilder Lehrman 2015-b). Production in all areas was increasing to meet the increased demands of cities, and the amount of land consigned to agriculture more than tripled between 1850 and 1950 (Mundlak 2005). Unlike in the early 1600s, when laws required farms to be located within half a mile of the town's central

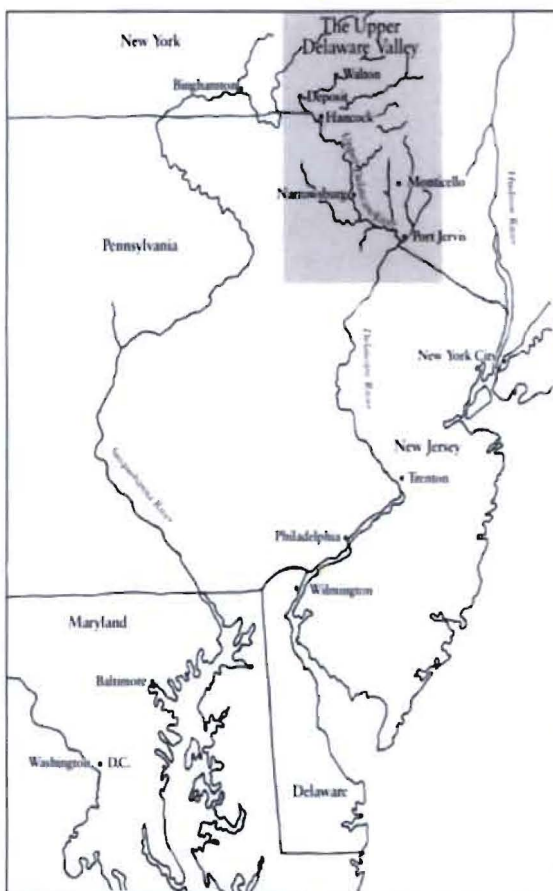


Figure 4. Timber rafting began in the Upper Delaware Valley in the 1760s and quickly became an economic foundation in the area following the American Revolution (McGregor 1988).

meeting place (Lemon 1987), by this time, agricultural products were shipped into urbanized cities from the surrounding countryside and farther. Following the American Civil War, expansion of railroads across the country allowed farmers increased access to railway shipping (Lauck 1996). Although not a food product, lumber was a product in high demand during the mid-1800s. Use of waterways and railways in the Northeast allowed lumber from mills in the upper Delaware Valley to travel as far as New York City and Trenton (Fig. 4) (McGregor 1988).

Finally, in the late 19th century, industrialism swept the nation and transformed cities into metropolitan hubs that became completely centered on production (Gilder Lehrman 2015-b). Instead of using natural resources only when necessary and working to replenish two-fold what was taken from the land, industrialism indiscriminately took from the earth, and gave back only in the forms of pollution and degradation. Industrial waste and growing populations in confined areas increasingly threatened water quality. Civil engineers were sent to Europe by sanitation commissions to observe separate carriage methods of water used for urban sewage and industrial disposal instead of a combined system that posed dangerous health risks (Fuhrman 1984). Forest acreage began to decline due to clear-cutting for lumber and planting. For example, lumbermen and farmers had cleared nearly a quarter of the original forest acres present in the Upper Delaware Valley by 1845, and land allocation for production continued to increase (McGregor 1988). Industrialist society no longer believed that nature held the power or spiritual significance it once had for ancient and indigenous people alike. Instead, man and his economic endeavors asserted complete power over the resources provided by the natural world.

A New Perspective?

The Industrial Revolution created a dependence on energy that was largely sustained by petroleum following the discovery of kerosene extraction from crude oils in the 1850s (Encyclopedia Britannica 2015). By the early 20th century, petroleum had become the most demanded commodity on the market (Riva 2013, Halliday 2005). Railroads powered by coal and oil crossed the nation to deliver products to cities and industrial complexes governed by the business of manufacturing. Fithian and Powell (2009) assert that modern idea of progress during the peak of the Industrial Revolution

still meant continuous improvement in all areas of life, but now also required commercialized standards and mass production. Although nature may have been providing the materials necessary for society to progress, nature itself was no longer seen as a limitation to man's possibilities (Fithian & Powell 2009). Industry was not only the force behind economic and political philosophies of the time; it became a lifestyle that required national acceptance and participation for America to successfully compete in the global market (Fithian & Powell 2009, Halliday 2005). Amidst the national desire for continuous progress, a new movement arose in contrast to this expanding industrial lifestyle.

Supported by the philosophies of the European Enlightenment a century earlier, the American Transcendentalist Movement emerged in the mid- to late 1800s and quietly persisted through the mid-1900s. The Romantic ideals present during the Enlightenment that production and consumption must remain within the provisional boundaries of nature were revisited (Fithian & Powell 2009). With Industrialism, many of these boundaries had been dismissed and replaced by only the limitations of man's production with little regard for the natural world. Many Transcendentalists asserted that man was capable of much higher thought, and therefore destined to examine and fully understand his place in the spiritual realm of the universe (Campbell 2013). Philosophers believed that immersion in nature rather than belief in progress through industrialism was the key to achieving true introspection.

One foundation of Transcendentalist philosophy was that a connection between the human soul and collective world energy could be understood through self-examination and would allow the individual to achieve true happiness (Campbell 2013). Considered a leading influence on American Transcendentalism, Walt Whitman discussed the physical

human body at length to connect it with the soul in his poem “I Sing the Body Electric” as part of his 1855 poetry collection, *Leaves of Grass*. Whitman’s transcendental ideals strongly focus on the individual as part of nature and humanity collectively:

The man’s body is sacred and the woman’s body is sacred,
 No matter who it is, it is sacred—is it the meanest one in the laborers’ gang?
 Is it one of the dull-face immigrants just landed on the wharf?
 Each belongs here or anywhere just as much as the well off, just as much as you,
 Each has his or her place in the procession.

(All is a procession,

The universe is a procession with measured and perfect motion.) (Whitman 1855).

For Whitman, the body becomes sacred through its unbreakable and undistinguishable link with the soul, which can be defined as the “spiritual principle embodied in human beings, all rational and spiritual beings, or the universe” (Merriam Webster’s 2010).

This new philosophy required man to step away from the industrial world and return to nature in order to find his soul and his purpose. Because Transcendentalists looked towards nature for answers and revelations, nature itself became divine (Matthew, Platt, & Noble 2011), and the process of understanding and identifying with nature was considered spiritual. In the United States, many of these Transcendentalist philosophies were explored through art and literature that worked to define the individual as a spiritual center. For example, Albert Bierstadt’s 1863 painting *The Rocky Mountains, Lander’s Peak* (Fig. 5) depicts an ecosystem including man both in harmony with and at the complete mercy of nature. The grandiose and majestic nature of the painting’s landscape illustrates

the immense power nature has over both the individual's survival and spiritual understanding of the world and his role.



Figure 5. Bierstadt painted *The Rocky Mountains, Lander's Peak* following his first trip to the western frontier as part of a government survey. This was just one of the many paintings Bierstadt completed depicting his encounters on the expedition (Metropolitan 2015).

Happiness, higher knowledge, and a connection with the world could be achieved through a complete understanding of the self. The desire to become one with the world suggests that the external is somehow united with the internal and that knowing yourself and studying nature are one and the same. Author John Jay Chapman describes transcendental ideology: "The soul and the cosmos were somehow related, and related so intimately that the cosmos might be regarded as a sort of projection or diagram of the soul" (Rein 1968). Although emerging in a society long separated from ancient and indigenous beliefs, foundational principles of the Transcendentalist Movement correlate perfectly with those of universal connectivity, simply expressed in the words of modern thinkers.

Transcendentalist William Henry Channing defined the path to understanding as "...a vague yet exalting conception of the godlike nature of the human spirit... [it] was a pilgrimage..." (Rein 1968). For many Transcendentalists, like Channing and Whitman, nature could provide spiritual growth for the individual as well as philosophical guidance for American society as it continued to mature (Smith 1947).

The Green Revolution

Transcendentalism provided man with a spiritual reconnection to the natural world, but did little to bridge the physical divide between progressive production and nature's provisions. As the world's population continued to increase exponentially, demanding the use of more resources than ever before, the issue of food production rather than industrialism finally stole the spotlight. The seemingly infallible mantra of continuous progress was beginning to crumble under the outlook of maintaining food production per capita for the growing world population (Evenson 2005). While society was naively under the impression that its manufactured lifestyle had moved man away from a dependence on the land, the land remained a large source of food for most of the world's population, whether a large portion of their diet consisted of manufactured food or not.

By the 1960s, scientists had begun reinventing agricultural practices in order to increase output from the land, during the movement now called the Green Revolution (Douglas 1974). The development of disease-resistant and high-yield varieties of crops such as wheat and corn, in addition to the creation of advanced and mechanized agricultural technologies, was central to the Green Revolution. As these innovations were implemented in countries such as Mexico, export of excess production lead to economic prosperity and the creation of agricultural research centers such as the International Maize

and Wheat Improvement Center (Evenson 2005). In 1960s India, mass famine due to rapid population growth was avoided because of the planting of high-yield rice called IR8 that could produce more grain than normal rice plants when adequate irrigation and fertilization techniques were applied (Briney 2015).

The Green Revolution worked to feed millions of people who might otherwise have perished due to inadequate food supplies. In addition to the development of high-yield, disease- and drought-resistant crops that were in some cases more nutritious than the previously available options, the Green Revolution transformed the realm of agricultural technology (DeGregori 2004, Sen 1970). The use of fertilizers and modernized irrigation techniques played large roles in the success of the movement. The new demand for fertilizers on the worldwide market increased the need for synthetic fertilizer production and created profits never before seen with the use of old agricultural techniques (DeGregori 2004, Tangley 1987). Even with the use of old practices, the biotechnological advances in food production allowed for people from all cultures and backgrounds to learn to feed themselves and provide income for their families (Miller 1977, Sen 1970, Tangley 1987). Not only had the Green Revolution proved that the land could be enticed to produce more than ever before, but also that there were substantial profits to be made in doing so (DeGregori 2004, Evenson 2005, Oommen 1971). With stomachs and pockets full, man had demolished the limitations of land and again attempted to prove his dominance.

Contemporary Sustainability

While the Green Revolution appeared to superficially resolve questions about food scarcity in the coming decades, its practices raised a larger concern on the environmental and public health radar. Increased use of fertilizers that acted as water contaminants

became a growing concern of many environmentalists in the 80s and 90s (Adams 2006, Raskin et al. 2002). The issue of freshwater availability and contamination crept into the discussion on agricultural practices. The production of synthetic fertilizers also came into question as they, like so many other industrial endeavors, relied extensively on fossil fuels that could not be replenished (Adams 2006, Raskin et al. 2002). Many of the crops grown in the United States became increasingly used for biofuels and manufactured foods, and created a growing concern about the American non-imported food supply (Lappe 2010).

As the issue of global climate change began to gain national and worldwide attention, agricultural technologies and practices came under scrutiny for their industrialist nature, driven by society's unrelenting desire for continuous progress. The same agriculture and energy practices that had worked to save and empower men had simultaneously degraded soil health, polluted countless freshwater and saltwater bodies, and destroyed habitats worldwide (Scoones 2007, Lappe 2010). As a result, a new philosophy emerged. Centered on a foundation of healing and restoring the land by learning production methods that would benefit both man and nature, this new philosophy focused on living within our means and the limitations of the land, and accepting that progress could occur without continuous linear production (Fithian & Powell 2009). Armed with an understanding that disastrous outcomes could result if changes were not made, the modern sustainability movement arose from the broken ground with a plan to heal the land and renew the spiritual connection between man and earth.

In the Name of the Future

First used to describe long-term forest management in 1700s Germany (Scoones 2007), the term *sustainability* gained a more widespread usage as the environmental

movement of the 1960s and 1970s emerged. Ecologists were becoming increasingly concerned with the ability of an ecosystem to recover from the stresses of industry. Almost every aspect of modern life was influenced somehow by commercialization, which had developed a routine of unnecessary overproduction (Tainter 2000). Continued linear progress required both effectiveness and high return per unit investment (Tainter 2000). From automobiles and air travel to textiles and energy production, industrialization provided the most cost-effective means to achieve massive product quantities. Unfortunately, in doing so, industrialization had shocked the natural resource pool so severely that complete devastation was closer than recovery. Resource development projects employed to ensure success of growing cities and economic demand were slowly destroying any chance of those resources being available for future generations.

Environmental activists used the growing concern over dwindling resources as a way to discuss global climate change due to industrialization. Potential collapse of the ecosystem in Mono Lake, California, due to overuse of water by the city of Los Angeles is a prime example. Water development projects in Los Angeles were prone to exhausting original water sources, and the city was continuously diverting increased amounts of water for the growing city (Cech 2009). The city's withdrawal from Mono Lake had caused the water level to drop 47 feet by 1976 (Else & Harrar 2000). After university researchers found the Mono Lake ecosystem on the verge of collapse, the city was ordered to return water to and limit future diversion from the lake (Davis 1998).

Up to this point, man had dismissed the reality of limitations and, as a result, the natural world was suffering. The technological advancements of the Green Revolution had transformed the way the world's population was feeding itself. Quickly becoming one of the

leading causes of climate change, industrialized food production replaced subsistence agriculture via the same tools responsible for progress (Tainter 2000). Unlike regenerative cyclical systems, progress through linear development would not be able to sustain the exponential growth rate of the human population. Adoption of *sustainable* practices and a production strategy that could unify values of the economic, environmental, and social realms became the new model for progress (Fithian & Powell 2009, Vucetich & Nelson 2010).

The sustainability movement called for the development of a new relationship between the human community and the environment so that resources would be available in future generations. Vucetich and Nelson (2010) claim that this relationship was dependent upon numerous factors including technology, responsible resource usage, and ethical obligations to ourselves,

future generations, and nature.

Unification of the three realms (Fig. 6) could only be reached following an understanding that human ethics and motivation must be the forces

behind development of a more

sustainable future (Fithian & Powell 2009, Raskin et al. 2002). Raskin, et

al. (2002), argue that environmental

strength and health are required for overall economic and social

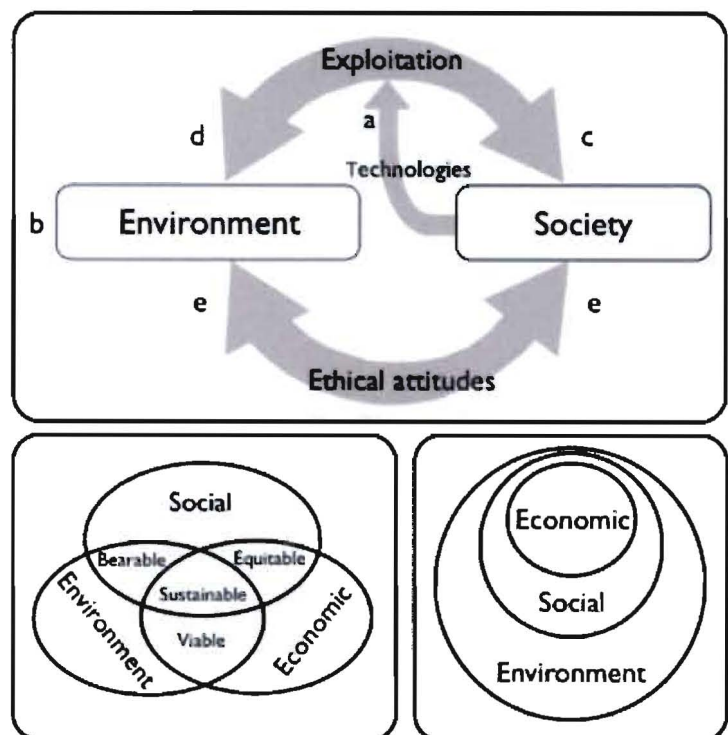


Figure 6. The social, environmental, and economic realms must be equally considered to develop a truly sustainable and effective action plan (Vucetich and Nelson 2010).

progress. Climate stabilization, resource management, energy production, and toxin emissions reduction must be addressed in order for society to successfully move forward (Raskin et al. 2002).

Sustainability introduced a model for progress that involved clean energy, essential production only, and restoration of the land and its resources so that production and recharge time could become better synced. Tainter (2000) claims the goal of modern civilization is to attain as much power, space, and material strength as possible despite the costs associated with continuous growth. Citing this linear view of progress as destructive to all aspects of life, attendees of the 1992 United Nations conference in Rio discussed striving for “sustainable livelihoods” as the solution (Scoones 2007). Adams (2006) describes the Brundtland Report of 1987 and its definition of sustainability as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” From socio-political realms, to ecological and environmental issues, the global community seemed to agree that a more viable future was required to achieve success and social happiness. Sustainability models primarily focused on improving the social or environmental realms (Adams 2006) have often economically benefitted the world’s leading nations, including the United States.

Cycles of Life

Unlike linear systems that could measure progress only by percent increases in production from previous years, sustainability presented cyclical models that measured progress through improvements in environmental and social health (Scoones 2007). There are multiple cycles driving everyday life on Earth, and all need equal consideration when considering sustainable practices. A few systems most directly impacted by sustainability

include the carbon cycle, nitrogen cycle, and hydrologic cycle. Individually, each of these cycles encompasses the movement of a single compound as it is consumed and returned to the natural system in its different physical states. Due to linear ideals of progress, social development has created blockages and significantly altered each system to the point of either over-saturation or collapse. The concept of developing sustainable livelihoods involves regenerating these cycles while minimizing the effects of man's artificial insertion into each system. These cycles operated effectively before humanity's introduction of large-scale activities such as agriculture, commercial development, and industrial production. Because such activities cannot be readily removed from the equation, these cycles must be modified to incorporate human action, but in a manner that respects the needs of the natural world over our own desires. In order to return to a successful system without the complete removal of man-made interference, sustainable practices that significantly reduce

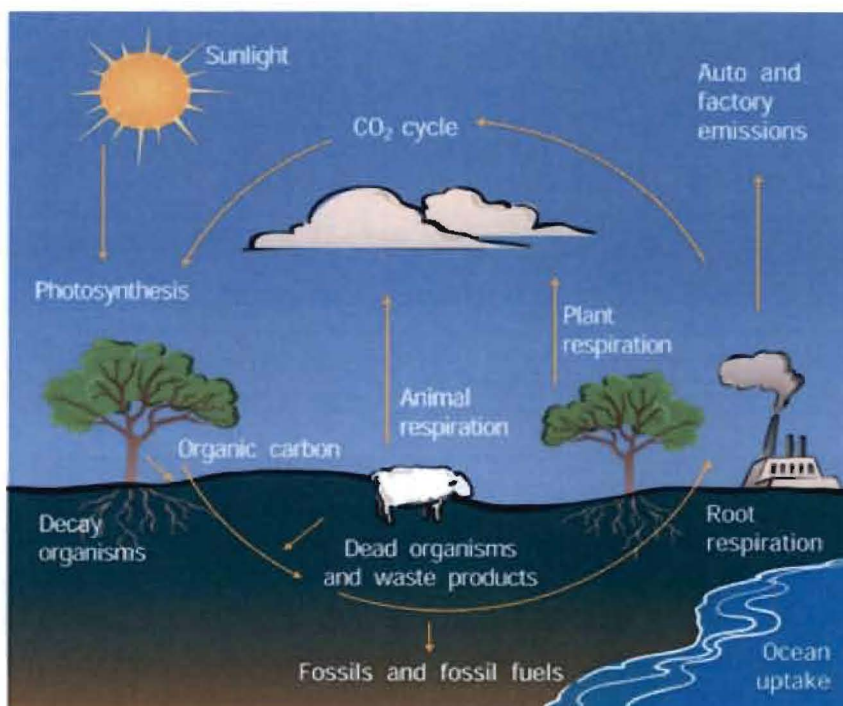


Figure 7. The carbon cycle works to balance the global carbon budget through exchanges between the atmosphere, living material, fossil fuels, and water bodies. Buildup of carbon in any particular area can be detrimental to the entire cycle (NCAR 2015).

the impact of said interference are necessary.

As the essential energy source and building block of all life on Earth, carbon is continually cycled through living ecosystems, fossil fuels, oceans, and the atmosphere (Fig. 7) (NOAA 2015-a). Carbon undergoes multiple chemical reactions to form the sugars that plants and animals need for food (Houghton 1993). More importantly, carbon in the form of carbon dioxide (CO_2) works to protect the Earth from detrimental heat loss by trapping radiation emitted from the Earth's surface (NOAA 2015-a). In the two and a half centuries since the Industrial Revolution began, fossil fuel combustion and vegetative land modification (e.g. forest clearing and conversion to agriculture) have increased the amount of atmospheric CO_2 by over 1 billion metric tons (Moore and Braswell 1994). The continuous increase in parts per million of CO_2 in the atmosphere (Fig. 8) has limited heat

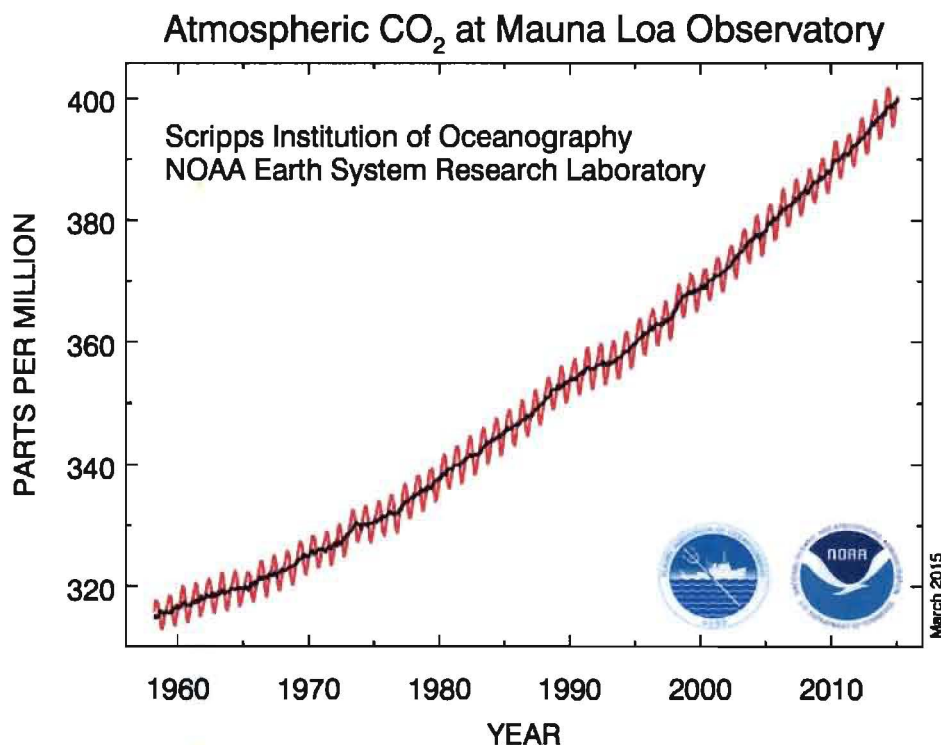


Figure 8. Currently at a concentration higher than 400 parts per million (ppm) in the atmosphere, carbon dioxide is a strong greenhouse gas that plays a major role in the regulation of surface temperatures on Earth. As atmospheric concentrations continue to increase, the more effective carbon dioxide will be at retaining heat (NOAA 2015-b).

loss from the planet, causing temperatures to rise globally (Moore and Braswell 1994), and oceans to acidify (NOAA 2015-a). Instead of burning through nonrenewable resources, sustainable energy production using solar panels and wind power would decrease atmospheric CO₂ emissions and potentially allow carbon sinks to recharge. Man's actions have directly created imbalances within the natural carbon cycle, but technological innovations would allow man to try and mend his mistakes.

Similarly to carbon, nitrogen constantly exists in multiple states throughout its natural cycle (Fig. 9) and is necessary for the production of both living and non-living material. A macronutrient used in structures of proteins and nucleic acids in living organisms, nitrogen is critical for life to exist. Acting as a nitrogen storage sink, soil

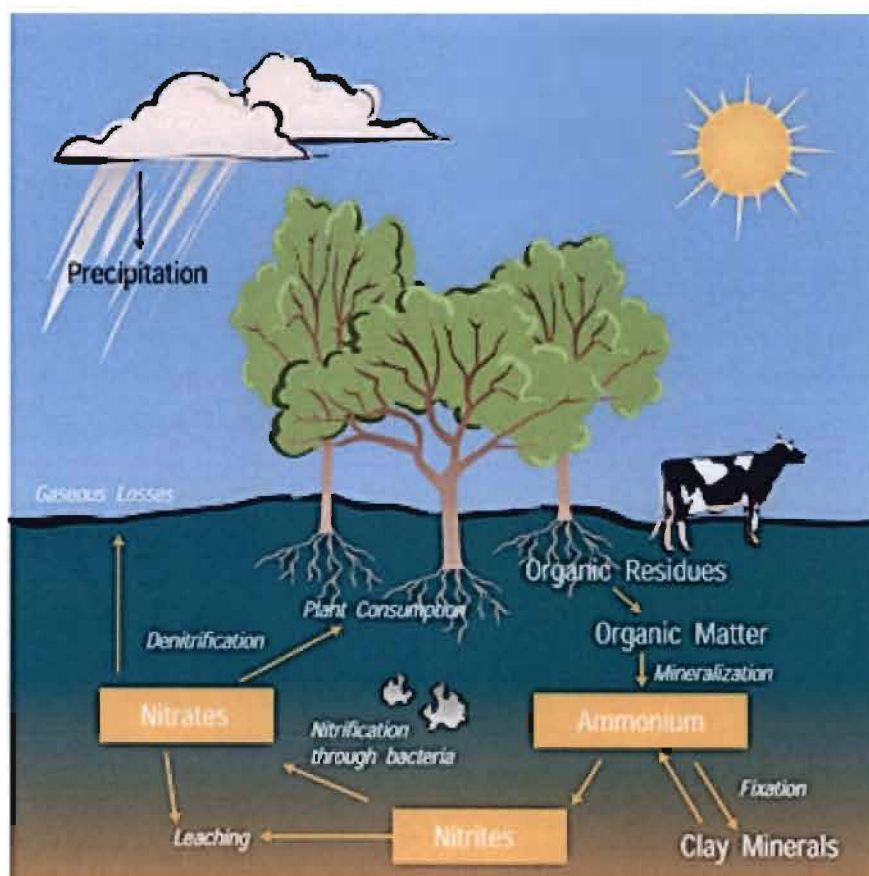


Figure 9. Numerous chemical reactions are required to effectively circulate nitrogen through an ecosystem. Bacteria in soils are primarily responsible for the important processes of fixation, nitrification, denitrification, and ammonification (NCAR 2015).

contains large amounts of nitrogen from decomposition and waste from plants and animals, which is then converted back to forms useable for plant growth (Killpack and Buchholz 1993). Nitrogen-fixing legumes can also convert inorganic atmospheric nitrogen into useable forms in soil. Although nitrogen is a critical soil component, it can be added to soil in dangerous excesses through the application of factory-produced artificial fertilizers or sewage used as fertilizer (Killpack and Buchholz 1993). Pidwirny (2011) claims that widespread use of artificial fertilizers since the Green Revolution has allowed humans to industrially fix as much nitrogen as occurs naturally through plant fixation, all of which surpasses what soil and plant ecosystems can physically use. Much of this excess nitrogen and other macronutrients found in artificial fertilizers ends up washing into waterways due to sediment erosion. Groundwater contamination, eutrophication, and acid rain are just a few of the results of humans drastically altering the nitrogen cycle (Pidwirny 2011). Sustainable pasture management practices and crop production methods are the keys to reducing continued over-nitrification of soils and water resources.

Neither a nutrient nor energy source, water is still the most essential compound among those previously discussed. The hydrologic cycle is the natural and continuous movement of water in all states in the atmosphere or across and below the earth's surface (Fig. 10) (USGS 2014). With a multitude of purposes from chemical reactions and hydration in terrestrial organisms to allowing aquatic species to breathe, water is required for all life to exist. While water covers a majority of the Earth's surface, less than 3% percent of that is freshwater, and less than 1% of all freshwater is accessible for continuous use (USGS 2014). Construction due to urbanization has created excess runoff issues (Cech 2009). Domestic, agricultural, and industrial uses have polluted freshwater and marine sources

alike. Over-population and over-use have caused water supplies to fall to lows never before seen and that could potentially run dry (Fulp 2005, Monroe 2008). Urbanization with a focus on sustainable water infrastructure and effective utilities management, such as the creation of city rain gardens and stormwater systems separate from sewer lines, is necessary to reduce our impact on the natural hydrologic cycle. Responsible water choices at the personal, local, and global scales are required to help recharge our limited freshwater supplies. 🌱

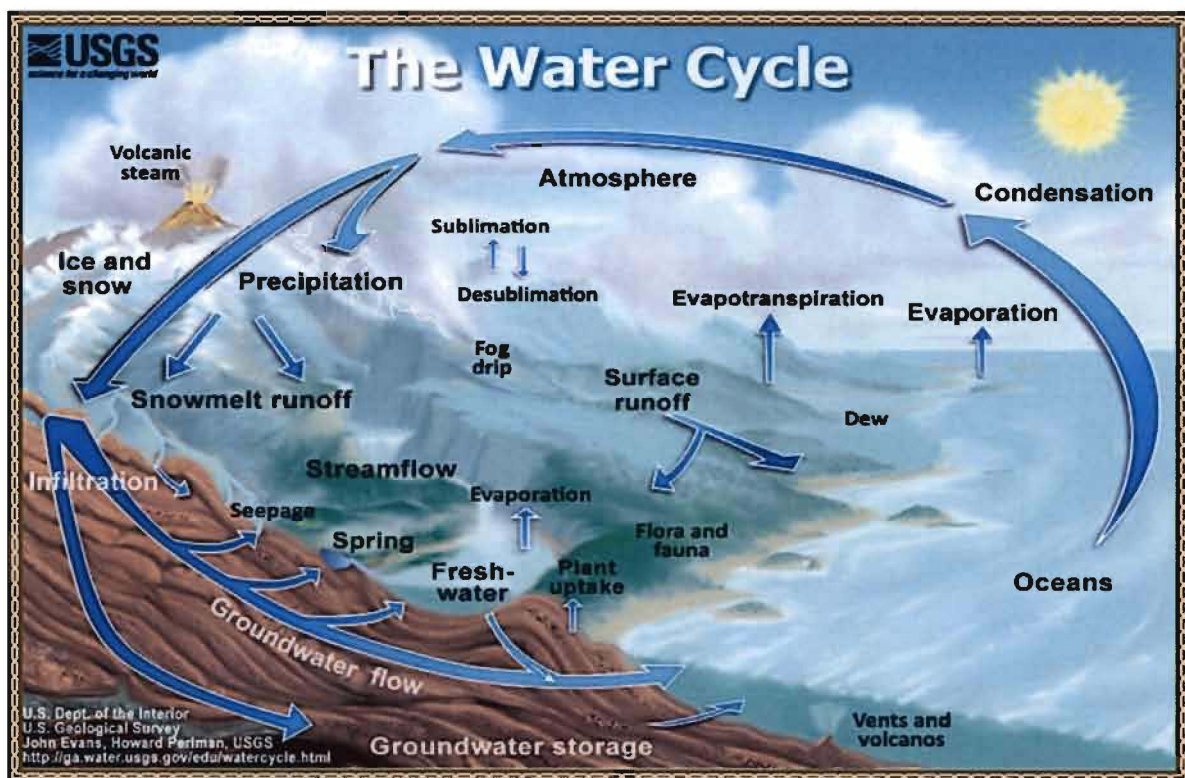


Figure 10. The natural processes of the hydrologic cycle including evaporation, precipitation, and infiltration, are reliant on factors such as temperature, humidity, and ground cover. Climate change resulting from industrialization, urbanization, and commercialism is responsible for much of the disruption of these natural processes (USGS 2014).

Our Daily Bread

Despite the widespread presence of industrialized food production and its current power-grip on the national market, sustainable agriculture and aquaculture techniques have recently emerged as economically viable alternatives. Although many methods such

as conservation tillage, rotational grazing, and cover crop planting are considered sustainable advancements, they are not new to the world of agriculture. In outlining the importance of soil to plants, farmers, and the nation, the *Yearbook of Agriculture* examined all three of the previously mentioned methods for successful farming (USDA 1938). With the introduction of the “industrial agribusiness model” in the 1970s, numerous negative consequences arose from the restructuring of U.S. agriculture (Bird & Ikerd 1993). As a result, the use of sustainable farming methods returned to small-scale agriculture (Bird & Ikerd 1993). A pioneer of the late 1900s contemporary alternative farming movement, Robert Rodale describes the three phases he feels U.S. agriculture needs to go through:

“...discovery of the natural resources upon which our agriculture is based, utilization of these resources for high-production initiatives, and development of a partnership with nature for sustainable food, feed, and fiber production in an environmentally sound and socially acceptable manner.” (Bird & Ikerd 1993)

In the face of increased environmental and human health concerns, and substantially decreased soil quality caused by industrial methods (Neher 1995), sustainable agriculture practices offer practical solutions for healthy food production.

Conservation tillage is a crop production system that requires little to no tillage, or uprooting of residual crop residues, between harvest and planting (MDA 2014). In contrast to conventional tillage where soil in all planted land is uprooted and mixed, conservation tillage requires that at least 30% of the soil surface remain covered with crop residues from the previous season (Fig. 11) (MDA 2014). Whether farmers till in narrow strips or ridges sparingly through crop residues, or plant directly into untilled surfaces, their use of conservation tillage techniques limits disturbance of soil microbial activity thereby

increasing organic matter and productivity (CTIC 2015). Possibly the most important consequence of conservation tillage is the reduction in soil erosion by up to 90% (CTIC 2015), which has positive effects on water quality, aquatic ecosystem health, and nutrient availability for plant growth.



Figure 11. Soybeans have been planted in strips directly into wheat residues. Although this method of strip-planting does require tillage, at least 30% of the wheat residues remain on the soil surface and will provide the soybeans with additional nutrients as they breakdown (MDA 2014).

Soil nutrients can also be retained in an agricultural or pasture area by implementing rotational grazing patterns or planting cover crops. Undersander et al. (2014) state that poor agricultural management and over-grazing has resulted in nearly 80% of pastureland in the Midwest currently suffering from severe weed, erosion, and infertility problems. One way to combat these issues is through the restoration of essential soil nutrients and limiting livestock access through rotational grazing. Rotational grazing allows large portions of pasture to regrow between grazing periods by moving livestock between paddocks, or pasture subdivisions (Undersander et al. 2014). By rotating multiple animal species such as cattle, chickens, and turkeys across the same stretches of land (VBC 2013-a), pastures are naturally fertilized via feces returning essential macronutrients to the soil and allowing for quicker re-growth (Beetz & Rinehart 2010). Legume and cereal

cover crops also work to restore soil nutrients by fixing atmospheric nitrogen, providing erosion control, and developing carbon rich root systems between regular planting seasons (SARE 2012). The increased organic matter and soil health built by cover crops typically results in better weed control and increased yields of the seasonal crop (Hartwig & Ammon 2002).

Another area that is becoming a strong and sustainable means of food production is land aquaculture and aquaponics. Land aquaculture systems grow and harvest fish, shellfish, and plant species using large tanks that create an easily controlled environment (Bardach 1987). Environmental threats associated with traditional marine and freshwater aquaculture systems include water pollution, increased stress on wild fish populations used for feed, and endangerment of wild species by escaped fish or the spread of pathogens and parasites (Cowan & Schienberg 2004). Sustainable land aquaculture practices avoid many of these hazards by containing fish in on-land tanks in low densities, eliminating the need to use antibiotics on the fish and any threat to wild fish populations due to escape (Bardach 1987). By raising omnivorous fish species, sustainable aquaculture can reduce stress on wild fish since there is no need to use them for fishmeal or oil in feed pellets (Cowan & Schienberg 2004). As a result of filter-feeding activity, sustainable shellfish farms work to improve water quality by increasing water oxygen levels, stimulating denitrification, and eating microscopic plants that would otherwise cause large algal blooms (Baker 1998). Many land farms also utilize a Recirculating Aquaculture System (RAS) (Kazmierczak & Caffey 1995). These systems allow companies, such as Bell Farms in Redkey, Indiana, to recycle over 99% of their water by flow (Bell 2014).

Bell Farms also utilizes excess nutrients and fish wastes generated in its aquacultures as natural fertilizers for the crops they grow to be used in their primarily plant-based fish feed (Bell 2014). By connecting recirculating aquaculture and crop production, this system is effectively maximizing use of its components in an environmentally friendly way. Crop-fish aquaculture integration is also seen in smaller-scale aquaponics systems such as the one built by urban agriculture practitioner, Will Allen. Part of his Milwaukee Growing Power farms, the aquaponics system Allen developed utilizes gravity for water transport, raised beds with compost and gravel filtration for plant growth, and large tanks for farming yellow perch and tilapia (Fig. 12) (Growing Power 2014-a). Nutrient-rich water containing fish waste is circulated up to the raised beds,



Figure 12. By developing an aquaponics system similar to the one shown here, Will Allen is able to grow a wide variety of crops and herbs in raised beds above tanks holding yellow perch and tilapia. Using gravity for transport, water and nutrients are circulated throughout the self-purifying system (Aquaponics 2009).

fertilizing the plants before being filtered and purified naturally, and is then returned to the fish tanks.

Land-based recirculating aquaculture systems, cover crops, and rotational grazing patterns similarly work to replenish the health of natural soil and water cycles. Conservation tillage methods and aquaponics perform similar duties, and have rebuilt or created entirely new cyclical patterns of production. As opposed to linear practices that harvest crops and fish in increasing numbers, leaving little time for natural replenishment, these sustainable techniques allow nature to rest. The ability of these systems to simultaneously produce food and replenish natural reserves is reliant on a fundamental understanding of “waste not, want not.” Both conservation tillage and aquaponics utilize waste products from one area or period of production as a means of growth in another area in a circulating pattern. Nature could once again produce food in quantities healthy and abundant enough to sustain the human population, while continuing to restore itself, if these methods were implemented worldwide. These and other sustainable agriculture techniques have critically influenced the restoration of natural and cyclical food production methods.

Water is the Lifeblood

Unlike soil health and productivity, which can be improved and replenished relatively quickly with the implementation of sustainable growing practices, the decreasing availability of freshwater is not as easily resolved. Environmental stresses due to climate change such as prolonged drought and decreased snow accumulation are devastating water supplies worldwide (Cech 2009). Some of the biggest threats to freshwater resources have been agricultural and industrial water pollution and increasing human pressure to

match population and economic growth (Pacific Institute 2015). Overuse and unmonitored withdrawal has resulted in decreased discharge and velocity in large rivers and continually dropping groundwater levels in aquifers across the globe (Cech 2009). For example, during many years, Colorado River water never even reaches the Pacific (Pacific Institute 2015). Research institutes have developed water projects and management plans to assist energy producers and farmers use water more sustainably (Parks 2003). However, because freshwater cannot be quickly replenished once polluted or used, we must find out what the limitations are of the residual water supply and learn to live within them. Some the most sustainable water management practices are those designed to reduce the impact of man's physical interference with the hydrologic cycle. In addition to consuming and withdrawing water in a more responsible way, use of pervious concrete and urban agriculture in current development projects are a few of the techniques working to restore the natural water cycle.

Containing large void spaces, pervious concrete is a high-porosity concrete that allows precipitation to pass directly through it rather than run off (Fig. 13) (EPA 2014). Used in flatwork development for decades,



Figure 13. Rather than causing precipitation to run off its surface like regular concrete and asphalt, pervious concrete allow water to percolate through its meshwork of gravel particles (EPA 2014).

traditional concrete and asphalt mixes prevent precipitation from saturating soil and recharging groundwater in aquifers (NRMCA 2004). Runoff caused by regular concrete typically becomes stormwater, which is both wasteful and dangerous in areas prone to flooding (NRMCA 2004). By allowing water to drain through rather than off its surface, pervious concrete offers better control of runoff volume as well as significant reductions in pollutants entering nearby water bodies (EPA 2014). Varying in size, pore spaces in pervious concrete also provide a source of water and air for root systems of trees in close proximity to developed areas (NRMCA 2004). Most importantly, use of pervious concrete in recent development projects has aided in the slow recharge of aquifers on local scales (EPA 2014).

Development of urban agriculture spaces is another technique that has successfully reduced man's obstruction of the natural water cycle. Urban agriculture is the cultivation and distribution of food within city limits (Nolasco 2011). Although primarily a method of sustainable and local food production, urban agriculture methods rely heavily on responsible water use and restore living spaces. Urban infrastructure has created impermeable caps over vast areas of land that prevent rainwater from infiltrating soil (Cofie & van Veenhuizen 2008). The creation of green spaces for the use of urban agricultural production breaks these caps to allow passage of water and air through to the soil (Cofie & van Veenhuizen 2008). Water harvesting using rooftop catchment systems prevents excess runoff as well as decreases dependence on municipal sources that withdraw essential surface and groundwater (Nolasco 2011). Rainwater, runoff, and greywater may all be used in irrigation for urban agriculture and landscaping, which helps

to return large quantities of this otherwise wasted water to the natural hydrologic cycle (Nolasco 2011).

Pervious concrete and water use through urban agriculture are just two of the numerous methods working to manage our water resources sustainably. While urbanization has been responsible for the depletion and pollution of freshwater sources, sustainable water management techniques are helping to educate water users on the limitations of the natural hydrologic cycle. Implementation of green architecture and other green or “breathing” spaces inside cities, that also provide food to local communities, is restoring the disconnect in water’s natural flow from the atmosphere to underground storage areas and back. Although complete restoration rate is slow, wiser usage methods are helping to reestablish local water storage levels as well as improve water quality. Despite our inability to completely restore freshwater resources, sustainable water management has helped to reduce our impact on the hydrologic cycle as well as utilize our available water in a responsible manner that allows for natural replenishment.

...And the Future is Golden

Food and water are the only true sources of energy that life needs to sustain itself. Advancements and technologies of the last few centuries, however, have created a modern economy reliant on high demand for fuel and energy sources such as coal, natural gas, and oil. Water and air pollution, as well as increased greenhouse gas emissions aiding in global warming, are just some of the negative environmental effects resulting from the acquisition and use of these energy sources (Perelman 1980). In addition to raising environmental and human health concerns, reliance on these natural resources bares a much scarier socioeconomic concern: what happens when these non-renewable sources run out? Unlike

non-renewable energy, sustainable energy practices such as solar farming have far greater long-run potential while significantly reducing environmental impact, and allowing energy consumption to increase in a responsible way as third-world countries continue developing (Armstrong 2011). Although not directly influencing natural cycles, use of sustainable energy sources are working to restore long-term global production by decreasing reliance on non-renewable resources and providing sources of clean energy.

Perhaps one of the most abundant sources of clean energy is energy derived from solar radiation. Raw electromagnetic radiation from the sun is captured using photovoltaic cells on large panels before being converted to useful chemical, thermal, or electrical energy (Lof 1973). In comparison, one of the most common producers of electrical energy is coal. Mined from the Earth's crust, coal is then washed to removed impurities, and burned to produce steam, which powers an electricity-generating turbine (EPA 2013). While economically cost-effective in terms of production per generation area needed, the finite availability of coal and foreseeable rise in overall production costs are factors forcing the reevaluation of coal power in favor of more sustainable practices (Lof 1973). Coal power plants are also responsible for large amounts of polluted discharge water and the release of chemicals such as sulfur dioxide, mercury, and carbon dioxide into the atmosphere (EPA 2013).

In contrast to coal, which generates electricity indirectly, photovoltaic cells capture and convert solar radiation directly into electrical current used to power batteries or solar cells (Fig. 14) (Lof 1973). Due to the current high costs of solar energy conversion, the present primary uses of solar power are heating and cooling of commercial and residential buildings (Lof 1973). Director of the Solar Energy Applications Laboratory, George O. G. Lof

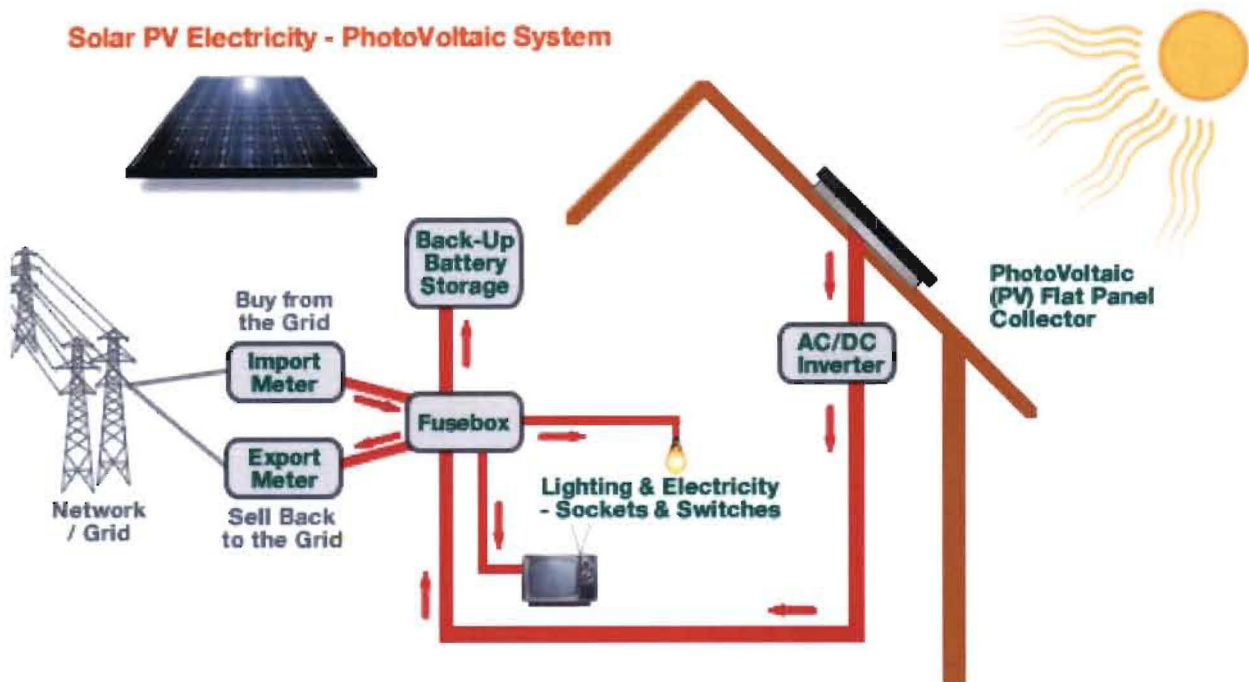


Figure 14. In direct solar energy conversion, solar radiation is captured using photovoltaic cells and an electrical inverter. This energy can then be used for heating and cooling or powering appliances, while surplus electrical energy can be stored in in back-up batteries (Power Service 2015).

states that, despite conversion costs, the advantages of solar energy are “its inexhaustibility, universal distribution, environmental compatibility, and negligibly low cost in raw form,” (1973). Although solar energy harnessing and conversion both pose some economic barriers, the long-term effects of decreased reliance on non-renewable resources are essential to allow the natural world time to recharge itself.

Still in the infant stages with respect to energy production, sustainable practices are continually being researched and developed as a means of reducing our dependence on coal and oil. For example, wind energy is considered one of the most important forms of renewable energy due to its relatively simple generation and competitive production cost (Leithead 2007). However, development of wind farms has also been associated with increased mortality of bat and bird species across the country (Hayes 2013). Although a source of sustainable energy, these technologies need to be improved upon to reduce such

negative environmental side effects. Despite still being developed, solar energy production is currently providing clean and sustainable energy to hundreds of thousands of homes and business across the country (Sanburn 2015). While industrialization has continuously removed and burned the Earth's resources, and has caused massive environmental decline, sustainable energy practices are helping to resolve those issues. Besides working to reduce national and worldwide dependence on non-renewable resources, sustainable energy is in effect restoring a more basal state of dependence, in which the only forms of energy we rely on are once again food, water, and the other natural elements.

Rediscovering an Old Truth

The contemporary sustainability movement emerged amidst the linear desires of economic development, urbanization, and industrialization, which all showed little regard for the state of the Earth. With hopes of rebuilding the Earth's provisional ability by reducing human impact, respecting natural limitations, and allowing the land to rest, followers of the sustainability movement knew that restoring nature's cycles was critical. Today, this movement has grown to become part of national initiatives for nutrition education and community engagement, urban development projects, and worldwide long-term production methods. Additionally, nearly every application of sustainable practices offers the potential for personal growth by developing an understanding of our role as stewards of the Earth. By acknowledging the important role we play with respect to the Earth's natural cycles, we can begin to understand both the magnitude of our actions as well as the importance of the individual within the much larger system.

Therefore, sustainable methods can be viewed as both mechanisms used by the individual and society to achieve a spiritual understanding of place and purpose, and

symbols of a contemporary belief in universal connectivity. Just as the ancient and Pre-Industrial belief in universal connectivity stressed the equal importance of the self, human collective, and universe, so too does sustainability emphasize the value of the individual, society, and the Earth. Sustainability requires a fundamental understanding that life on Earth is connected to the Earth itself, and that all aspects of life must be considered useful and valuable. We must ensure the health of the air, water, and land in order to survive ourselves. While political and economic forces drive many aspects of sustainable development, the sustainability movement is largely a social construct with a foundation built upon personal belief systems. In that respect, sustainability as a modern interpretation of the beliefs of universal connectivity can be viewed as a spiritual endeavor to reconnect with the natural world.

Modern Interpretations

Simply put, the physical components of sustainable methods are designed to restore natural cycles by limiting human impact as best as possible. However, both the ideology behind and actual implementation of sustainable practices can have deeper spiritual undertones that mirror the concepts of universal connectivity. The practices of sustainable agriculture may provide one of the best examples of these deeper connections. For example, sustainable agriculture places a huge emphasis on the importance of soil for the health of an entire ecosystem.

All terrestrial life depends on the soil in one form or another. Humans require food that comes from animal or plant sources that are either directly or indirectly connected to the soil. From a biological perspective, transfer of energy can be viewed in the process of photosynthesis and cellular respiration. Plants use solar energy to build sugars that are

broken down by eukaryotic consumers to produce energy for survival (Shuster et al. 2012). Without a healthy medium for growth, this cycle eventually fails to produce enough nutritional plant matter for consumers. The Ancient Mesopotamians relied so heavily on the fertility of their land for food that they took great care of their soils and often made sacrifices to the gods (Potts 1984). Sustainable agriculture aims to replenish soil health so that our own health as consumers as well as the overall buildup of organic matter (Bot & Benites 2005) may be restored. By first rebuilding the physical connection between our bodies and the Earth through healthy food production, we can begin to realize the spirituality associated with sustainable agriculture.

Although we may not make sacrifices so that the gods will provide us with good yields, we must physically tend to the land with care so that it will provide us with the nourishment our bodies need. Sustainability views the role of the farmer as a steward of the land, similar to the relationship seen between people and the land in ancient cultures (Lewis 1993). We cannot expect the land to provide for us if we do not reciprocate care for the land. In addition to helping build a connection between the individual and the Earth, sustainable agriculture also helps to reunite communities and define social progress. Just as agriculture was an integral part of daily activities and community life in Ancient Mesopotamia, urban agriculture practices and sustainable farms are typically a product of community involvement. Urban agriculture and aquaculture projects such as those at Growing Power in Milwaukee, Wisconsin were designed to provide underserved populations with access to healthy food (Growing Power 2014-b). In doing so, these projects united entire communities and created healthy environments for at-risk young people, all while the community comes together to grow food in a restorative manner

(Allen 2012). According to Allen (2012), agriculture and food are meant to be enjoyed as shared and bonding experiences within a community; aspects of life that unite despite economic or political boundaries. By this convention, the practice of sustainable agriculture may become a shared spiritual experience that uplifts both the individual and whole communities to achieve an understanding of continued respect for the land.

Similarly, sustainable water management practices can be viewed as symbols of a contemporary belief in universal connectivity in that they place emphasis on both individual and collective action. Organizations across the country are working to educate the public about water usage efficiency and household practices that use water more responsibly (Shuster et al. 2012). Government research agencies are working to implement better pollutant monitoring systems in order to decrease risk of freshwater contamination by industrial and urban sources (Shuster et al. 2012). Although considered a renewable resource, our freshwater supply is limited in its ability to withstand the growing pressures of urbanization. Sustainable water management requires each individual to use water more responsibly, and demands that communities respect and understand that all people need water. The effects of collective and individual action are significant when it comes to water sustainability, and it is through this unity that the ideals of universal connectivity can be seen. Water is necessary for all life and can only be provided by the Earth itself. Therefore, to ensure our survival, we must respect the limitations of the Earth and do everything we can to protect its water supply.

Sustainable energy development can also be considered an expression of our belief in universal connectivity due to its advocacy of deriving energy from natural yet renewable sources and by restoring our connection with humanity and the universe. Our use of fossil

fuels has caused destruction beyond measure when considering the fate our world faces due to global warming and climate change. The United States, in particular, consistently exceeds the world average ecological footprint, and the primary culprit is energy consumption. Burning of coal and oil for energy worldwide has resulted in increased global temperatures, rising sea levels, and the first instances of environmental refugees due to climate change (Torrice 2000). By converting to sustainable energy production methods such as solar power, the negative effects of fossil fuel exploitation can be slowed with the ultimate goal of eliminating greenhouse gas emissions completely in the future (Shuster et al. 2012). Implementation of sustainable energy projects requires an acknowledgement by the human population that we alone are responsible for the current state of the world, and acceptance of the responsibility of both trying to fix this problem and helping those people already being affected by rising sea levels. Commitment to non-carbon and renewable energy development is a commitment to both humanity and the Earth itself, and would demonstrate that we are doing what we can to restore the atmosphere and maintain sustainable lifestyles.

Stewardship and the Tripartite

Ancient cultures may have understood the importance of nature on a more spiritual level than contemporary society. However, growing environmental concerns have caused increased acceptance of sustainable practices in an attempt to fix our mistakes. Although an amazingly successful species, humans have a tendency to wait until disaster is eminent before attempting to solve the problems they have created. Throughout modern times, the human obsession with growth, development, and progress required endless exploitation of the Earth's resources. As people discovered more of the world, our understanding of

limitations was lost. Not only have we caused countless negative environmental and social effects because of our desire for progress, but we have also destroyed those pivotal connections between the natural world and ourselves (Lewis 1993).

Sustainable methods will never allow replenishment of our fossil fuels, and may never completely heal the soil or rebuild freshwater stocks. Furthermore, many people do not feel that sustainable practices are economically viable enough to invest in permanent changes to current production methods. Despite a widespread lack of acceptance by the economic and political-industrial complexes that govern much of our world, there are those who believe in the importance of sustainability. Practitioners, financial supporters, and consumers of sustainable agriculture, energy, and water management projects believe in the positive effects such practices can have on the natural world. They may even share a larger connection: an understanding that the fundamental ideals and actions of sustainability allow the individual to reconnect with the Earth, and find himself in doing so.

In many ancient cultures, the Earth itself was considered sacred and deserving of honor similar to the gods (Ball 2002, Coggins 1996, Van Buren 1948). As lesser humans, we were responsible for the Earth's wellbeing and appeasing its demand for respect through offerings and caretaking. Most modern religious belief systems place a much higher importance on the individual, his place in the world, and his destiny than did ancient beliefs, but sustainable practices offer a blending of ancient and modern ideals (Lewis 1993). Practices such as urban agriculture, conservation tillage, pervious concrete, and solar power can all be viewed as symbols of our current belief in universal connectivity because of the important connections they rebuild between the individual, society, and the Earth. While this belief system was central to spiritual identity for earlier cultures such as

the Mesopotamians, Aztecs, and Native Americans, in contemporary society it can be viewed more as a social construct through which people reconnect with each other and nature itself. Sustainable methods help to repair land, protect water, and generate energy in ways that will allow nature to continue providing into the future. It is through those methods that we are trying to restore the world's natural cycles so that our ecosystems remain viable and life may continue.

In this way, sustainable practices can be considered modern offerings of our commitment and submission to the Earth, and it is through this submission that we have the opportunity to discover why the Earth is so important to us. Some may discover that the health of the Earth is necessary for all of life to survive. Others may see sustainable practices as a way to unite people and strengthen our communities on the basis of collective action. And a few people may even discover a deeper understanding: that our bodies and the Earth are built of the same fundamental materials, and cannot be separated in neither prosperity nor catastrophe. It is the realization of all three discoveries that equates the concept of sustainability with universal connectivity and gives humans a new purpose in contemporary life. The concept of man's dominance slowly developed over time, but allowed us to see the world as existing only for our unlimited use. The artificial inflation of our roles within the world's natural cycles has caused disruption on massive scales. It is our responsibility to find ways to correct our errors, and sustainable practices provide a means to do so. Sustainability urges that we can no longer believe in our dominance over the land, but instead admit that we are at its mercy, and that we must once again accept the duty of serving the land so that it may provide. Issues such as environmental degradation, declining food nutrition, and global warming due to climate

change are the Earth's way of calling out to us to rediscover our role as stewards, so that all life might survive. We must answer this call.

"The land is mine and you are but my aliens and my tenants. Throughout the country that you hold as a possession, you must provide for the redemption of the land."

Leviticus 25:23-24

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